Dr Tonry
from the Author

PART I.

THE

PRICE { £1..10. *coloured.*
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GENERA AND SPECIES

OF

ORCHIDEOUS PLANTS.

BY

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&c. &c. &c.
PROFESSOR OF BOTANY IN THE UNIVERSITY OF LONDON;

ILLUSTRATED

BY DRAWINGS ON STONE FROM THE SKETCHES OF

FRANCIS BAUER, ESQ. F.R.S.; L.S. & H.S.

THIS PART CONTAINS:

PLATES 1. 2. 3. 6. 8. 9. 10. FRUCTIFICATION.

PLATES 1. 2. 3. ..... GENERA.

LONDON:
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M. DCCC. XXX.

PROSPECTUS.

The Plates, which form the principal part of this Work, will be entirely prepared from sketches communicated to the Author by Mr. Francis Bauer of Kew from among the numerous materials illustrative of Vegetable Anatomy and Physiology, to the preparation of which his long and active life has been devoted. This invaluable Collection has, unfortunately for science, been hitherto known to those only who have been so fortunate as to enjoy Mr. Bauer's personal acquaintance; but to all such it has always been opened with a freedom which demands the warmest acknowledgements.

To make the whole of these splendid specimens of art public by means of engravings capable of expressing the beauty of the originals, would be an object worthy of a liberal Monarch and an enlightened Government; to a private individual the large expense must necessarily prove an insuperable impediment. But it has occurred to the Author, that a selection of such as throw the greatest light upon structure could not be otherwise than important, even if the manner in which the engravings should be executed were much inferior to what the high finish of the drawings demands. Mr. Bauer having, with a liberality eminently characteristic of a mind which pursues science for its own sake only, consented to waive the latter point, upon the representation that much benefit must accrue to science by the publication: the commencement of a selection of subjects illustrative of the structure of Orchideous plants is now laid before the public, with the earnest entreaty on the part of the Author that all imperfections in the execution of the plates may be ascribed to himself, and not to Mr. Bauer. It has been found indispensible to make use of lithography instead of engraving on copper; and unfortunately the

former art, even in the most skilful hands, is scarcely adapted to high finish or delicate touch; when executed by a mere amateur (as part of the plates has been) it is still less calculated for such an object. It is however hoped that the principal facts explained by the drawings have been faithfully represented, and that the defects of some of the plates as works of art will not be prejudicial to them as illustrations of science.

The sketches were commenced by Mr. Bauer in 1791, and have been continued at intervals up to the present time; a great part, particularly those of the European plants, was executed between 1791 and 1798, and all the more important illustrations of physiological facts before the latter period. They were made with a view to determine both the distinctive characters of genera, and the anatomy and physiology of the organs of fructification of the singular plants they represent. Explaining in the clearest manner the real structure of the anthers and pollen, with all the extraordinary apparatus that is peculiar to those organs—shewing the exact anatomy of the stigma, the stigmatic canal, the ovarium, the fruit and the seed—and hence elucidating the mode in which impregnation is effected, and the relation the several parts bear to each other—they demonstrate the existence, in the whole tribe, of a unity of design and a simplicity of structure which may seem incomprehensible to the observer who has only examined an Orchis and a Malaxis, but which daily experience assures us is never departed from by Nature in any of her works. These investigations and illustrations had been brought to a state of great perfection by Mr. Bauer long before any clear or rational account was published upon the subject; as will be seen by comparing the dates of the sketches from which these plates have been executed, with the published writings of botanists: this may to some appear the statement of an unimportant circumstance, but the Author confesses it seems to him an indispensible act of justice to one of the most accurate observers and liberal-minded men that this or any age has seen.

The plates are divided into two series; the one called "Fructification," illustrating points of anatomical or of physiological importance;

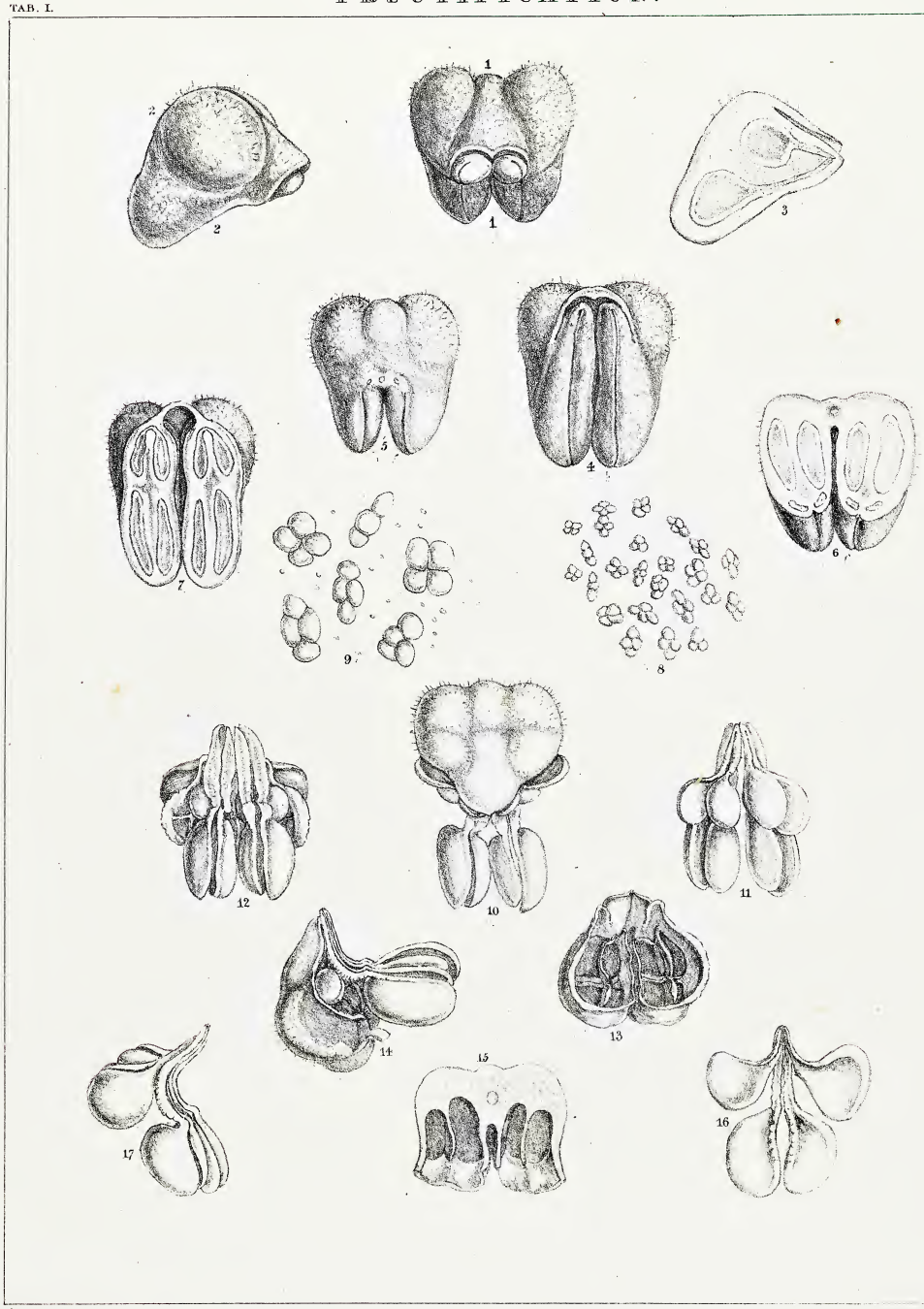
the other entitled "Genera," referring to the distinctions upon which some of the more remarkable genera are founded. To what extent they may severally go, the Author has not absolutely decided; probably not beyond 50 or 60 altogether; but this will necessarily be determined by circumstances.

In the final Number the general characters of the order will be given, with references to the plates which will at that time have been published. It is proposed upon the same occasion to explain Mr. Bauer's views of the structure and functions of the different parts of the sexual apparatus, and to shew upon what evidence his theory of their mode of impregnation is founded. This most interesting subject cannot be properly treated of sooner, because it is probable that every plate that the Work may contain when complete will be required for the illustration of the enquiry.

London, November, 1830.

TAB. I.

FRUCTIFICATION.



J. L. ad icones. Francisc. Bauer

FRUCTIFICATION.

Tab. I.

The anther and pollen-masses of Bletia Tankervilliæ; from sketches by Mr. Bauer in August 1801. This plate illustrates the structure of the Tribe called Epidendreæ.

1. A young anther seen in front; magnified 8 times.
2. A side view of the same.
3. A vertical section of one of the lobes of the same, shewing the early formation of pollen in the solid substance of the anther, and the origin of the filaments or straps by which the masses are finally connected.
4. A view of the face of the lobes of the anther; magnified 8 times.
5. A back view of fig. 1. shewing that there are three vascular cords that pass out of the column into the anther.

6. 7. Transverse and vertical-tangental sections of the young anther, shewing that the pollen-masses are all originally secreted in different parts of the substance of the anther, which at first is a solid mass.

8. 9. Grains of pollen magnified; fig. 8, 100 times, fig. 9, 200 times; to shew that they cohere in threes or fours, and are themselves composed of more minute particles, as is apparent from fig. 9.

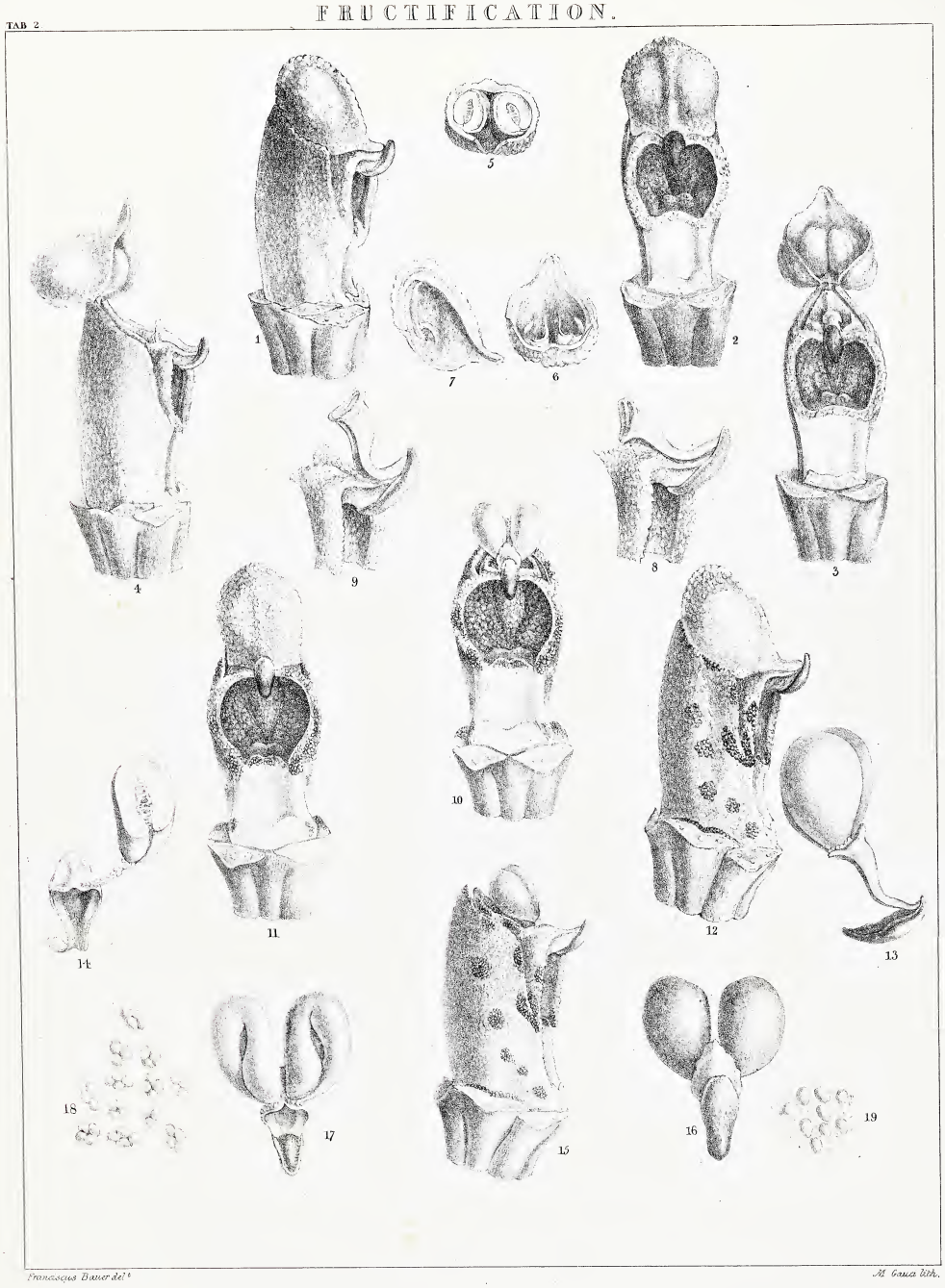
10. A full-grown anther dropping out its pollen-masses; magnified 8 times.
12. A view of the underside of the same.
14. A side view of the same.
13. A view of the interior of the anther, shewing the eight cells for the reception of the same number of pollen-masses; magnified 8 times.

11. 16. 17. Various views of the pollen-masses, shewing that the eight lobes are all connected by filaments or straps, which unite at the apex of the anther.

15. A section of the anther, shewing the thickness of the connectivum and the space occupied by the masses of pollen. All these figures are magnified 8 times in diameter.

TAB 2

FRUCTIFICATION.



Franciscus Bauer del.t

M. Gauci lith.

FRUCTIFICATION.

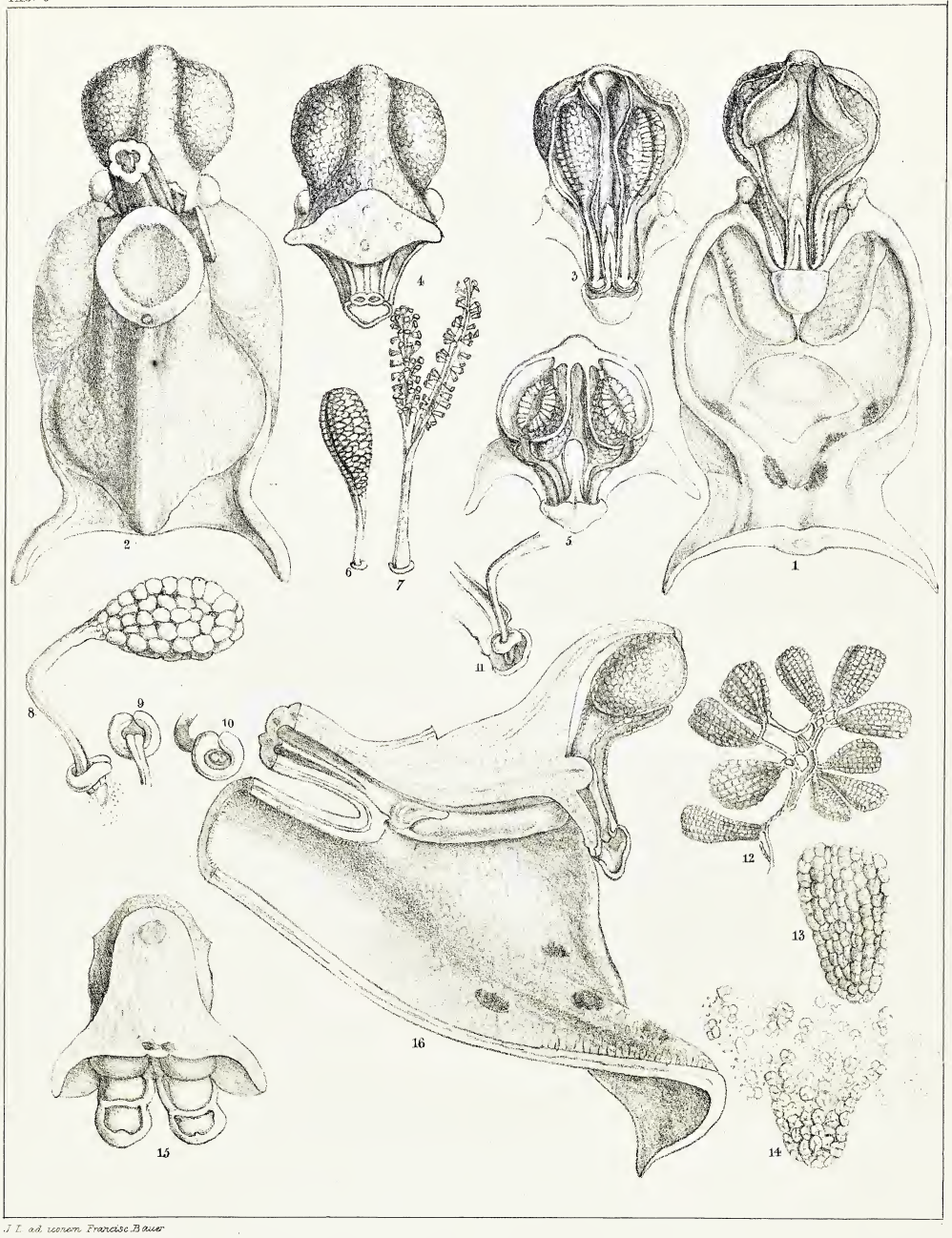
Tab. II.

The column and sexual apparatus of Brassia maculata; from a drawing by Mr. Bauer made in May 1807. This plate illustrates the structure of the Tribe called Vandeæ.

1. 2. Front and side views of the column of an unexpanded flower; magnified 6 times; these shew the early formation of the gland, the vertical position of the anther, and the nature of the stigmatic cavity.
3. 4. Side and front views of the same, the anther being turned back; and the clinandrium laid bare, to shew that at this period the gland and the caudicula are separable from the pollen-masses, which are still enclosed within the cells of the anther.
5. A transverse section of a young anther, shewing the early formation of the pollen; magnified 6 times.
6. A front view of an anther after the pollen has dropped, shewing the membranous valves; magnified 6 times.
7. A vertical section of the same.
8. 9. Two half profile views of the upper end of the column, having the gland and the caudicula in a very young state, no adhesion with the pollen-masses being perceptible; magnified 12 times.
10. A front view of the column of an expanded flower, the anther being removed, and the pollen-masses, gland and caudicula in their natural position; magnified 6 times.
11. 12. Front and side views of the same, with the anther not removed.
13. A side view of the two pollen-masses, their caudicula, and gland; magnified 12 times.
14. A back view of the same, with one of the pollen-masses removed, and the other drawn a little off the caudicula and cut across, so as to shew the hollow centre which communicates with the external fissure.
15. A side view of No. 10.
16. A front view of No. 13.
17. A back view of the same, shewing the fissures in the pollen-masses.
18. The grains of pollen, cohering in threes or fours; magnified 200 times.
19. The ultimate particles of pollen; magnified 200 times.

TAB. 3

FRUCTIFICATION



J. L. ad. iconem Francisc. Bauer

FRUCTIFICATION.

Tab. III.

The sexual apparatus of Orchis mascula, &c. from a drawing by Mr. Bauer in May 1792. This plate illustrates the structure of the Tribe called Ophrydeæ.

1. A front view of the column of Orchis mascula with the base of the labellum, shewing the position of the anther, with its pouch, the cells of the former being partially open, so as to shew the pollen within; on each side of the anther are seen two granular tumours, which are the rudiments of stamens; magnified 15 times.
2. A back view of the same; the orifice of a section of the ovarium being shewn above the mouth of the spur, a section of which occupies the centre of the figure; the spur is seen to be hairy inside.
3. A front view of the anther with the cells opened, so as to exhibit the pollen-masses inside in their natural position; magnified 15 times. The pouch in which the glands of the pollen-masses are confined is forced a little down.
4. The same viewed from beneath and behind. The back of the pouch is visible, with two foramina which communicate with the glands of the pollen-masses, and establish a communication between them and the stigma. In an unexpanded state the back of the pouch is pressed down close upon the stigma, and at that time the influence of the pollen is conducted to it through these foramina; after expansion the pouch and foramina are separated from the stigma by so considerable a space, that no communication can be established between them. See fig. 16.
5. A transverse section of fig. 3; magnified 15 times. In this the inner structure of the cells of the anther is exhibited, and the pouch is in its natural position.
6. A pollen-mass with its caudicula and gland, taken out of the anther; magnified 15 times.
7. The same; magnified 15 times; its pollen forcibly stretched asunder, and many of the granulations torn away.

8. A pollen-mass of Ophrys apifera with its caudicula and gland magnified 15 times; the gland is in the act of parting with the fecundating matter of the pollen.

9. A view of the upper surface of the gland, with the mode of insertion of the caudicula.

10. A view of the under surface of the same, shewing a cavity which communicates with the foot of the caudicula.

11. A section of the pouch, shewing the positions of the gland, the caudicula and the foramen.

12. A portion of the granules of the pollen-mass of Orchis mascula; magnified 50 times. This shews that all the granulations cohere by the means of a common elastic web, which is shewn forcibly distended, and that each granulation is composed of a number of series of particles of pollen.

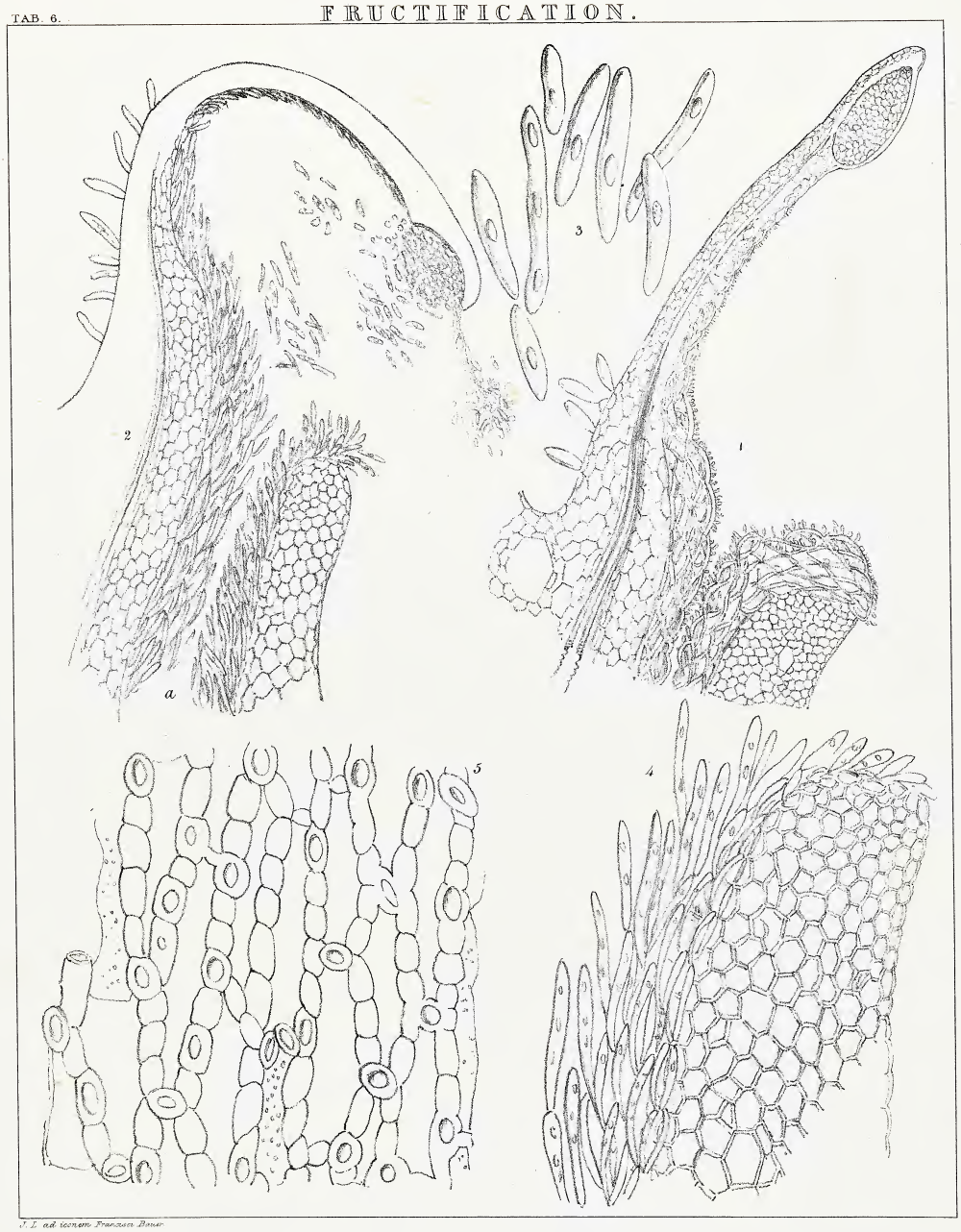
13. One of the granulations in its natural state; magnified 100 times.

14. The same partially dissolved in water, its component particles separating in threes, fours, pairs, and very minute simple molecules.

15. A back view of the double pouch of the column of Ophrys apifera shewing the wide foramina at the back of each pouch for maintaining the communication between the pollen-masses and the stigma; magnified 15 times.

16. A section of fig. 1, shewing the relative position of the anther, pouch, gland, stigma, and ovarium of Orchis mascula when the flower is expanded.

FRUCTIFICATION.



J. L. ad vivum Franzen Pinx.

FRUCTIFICATION.

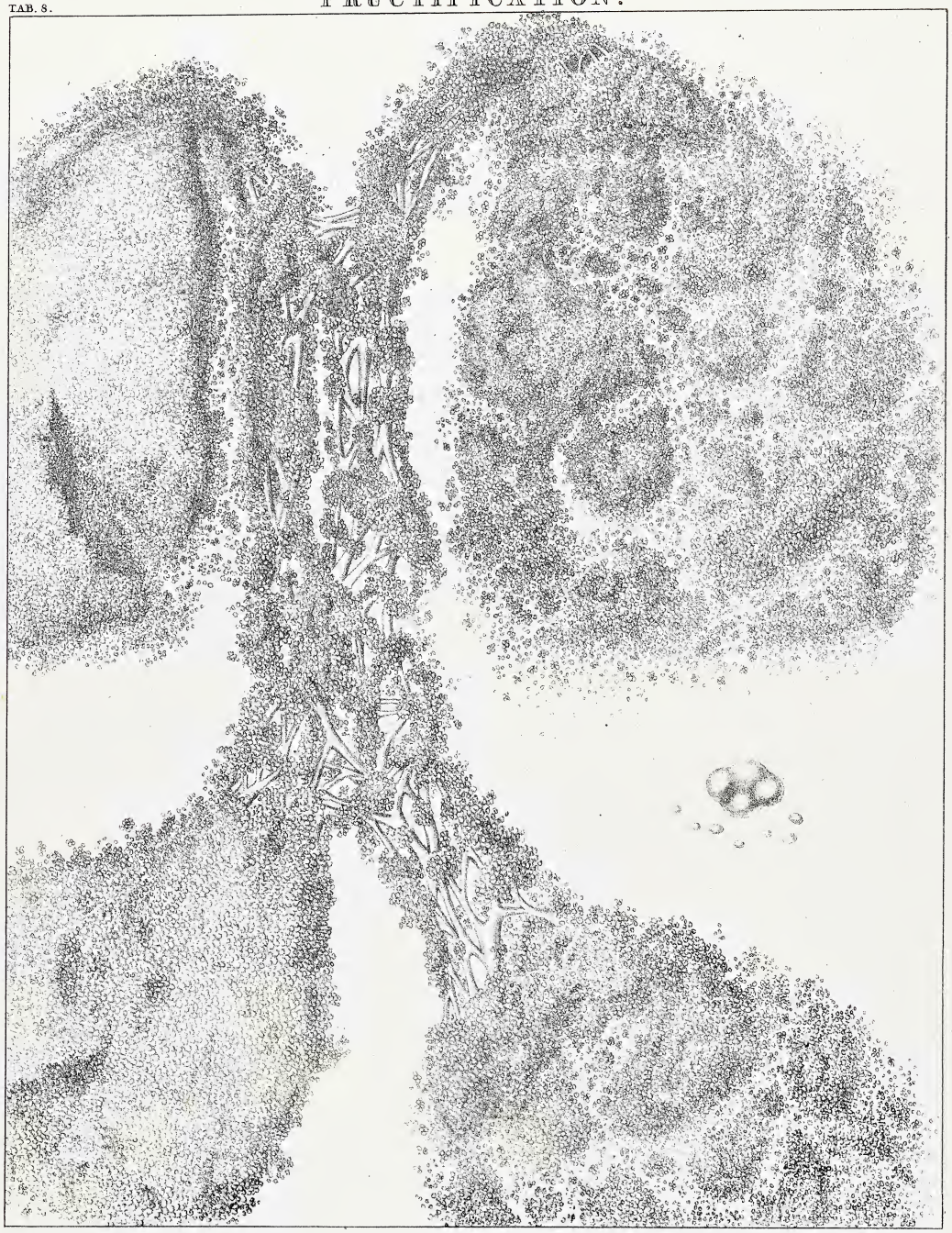
Tab. VI.

Anatomical views of the stigma and stigmatic surface of Bletia Tankervilliæ; from a sketch by Mr. Bauer in 1802.

1. A section of the anterior lip of the clinandrium, the stigma, and a portion of the stigmatic canal before impregnation, if viewed under water; magnified 24 times. The stigma, which occupies the upper extremity of the figure, is a close sac of cellular tissue: the stigmatic canal is composed of an extremely loose plexus of cellular tissue fringed by minute hairs.
2. The same after impregnation. The stigma is discharging the matter it contains; and the plexus lining the stigmatic canal (*a*) is converted into a mass of loose separable oblong bodies, having their free extremities pointing upwards.
3. Some of the same bodies magnified 200 times. They are perfectly transparent, and appear to be cellules of an oblong or fusiform figure, with one, two, or three granular, more opaque, greenish yellow specks, looking like young seeds of an Orchis in the midst of loose reticulated testa.
4. Longitudinal section of a portion of the surface of the upper part of the stigmatic canal represented at fig. 2; magnified 100 times. This is seen under water.
5. Transverse section of a portion of the dense mucous substance lining the stigmatic canal, when viewed after having been kept a few minutes under water; magnified 200 times.

TAB. 8.

FRUCTIFICATION.



F. Bauer del.

M. Gauci lithog.

FRUCTIFICATION.

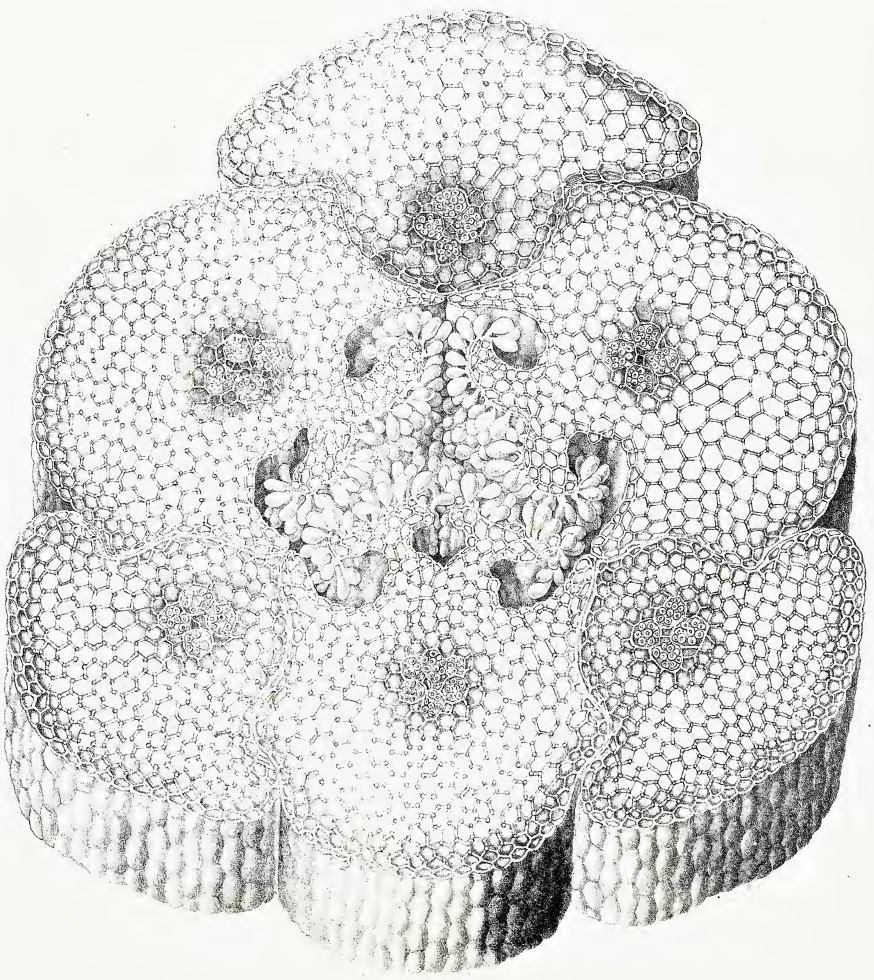
Tab. VIII.

A view of the pollen-masses of Bletia verecunda dissolved in water; from a sketch by Mr. Bauer in 1801.

This figure is to shew the real nature of the waxy pollen-masses of Orchideous plants. When examined as represented in this figure they are found to consist of innumerable particles of pollen cohering in pairs, threes, or fours, by means of a delicate, transparent, elastic web. The central part which connects the four lobes is what appears under the form of connecting filaments or straps, which are found from this figure to be a mere plexus of this elastic web, with a small quantity of loosely cohering grains of pollen scattered among it. Magnified 100 times.

The separate figure, of a grain and some granules of pollen, is magnified 400 times.

FRUCTIFICATION.



J. L. ad. iconem Francisci Bauer

M. Gauci lithog.

FRUCTIFICATION.

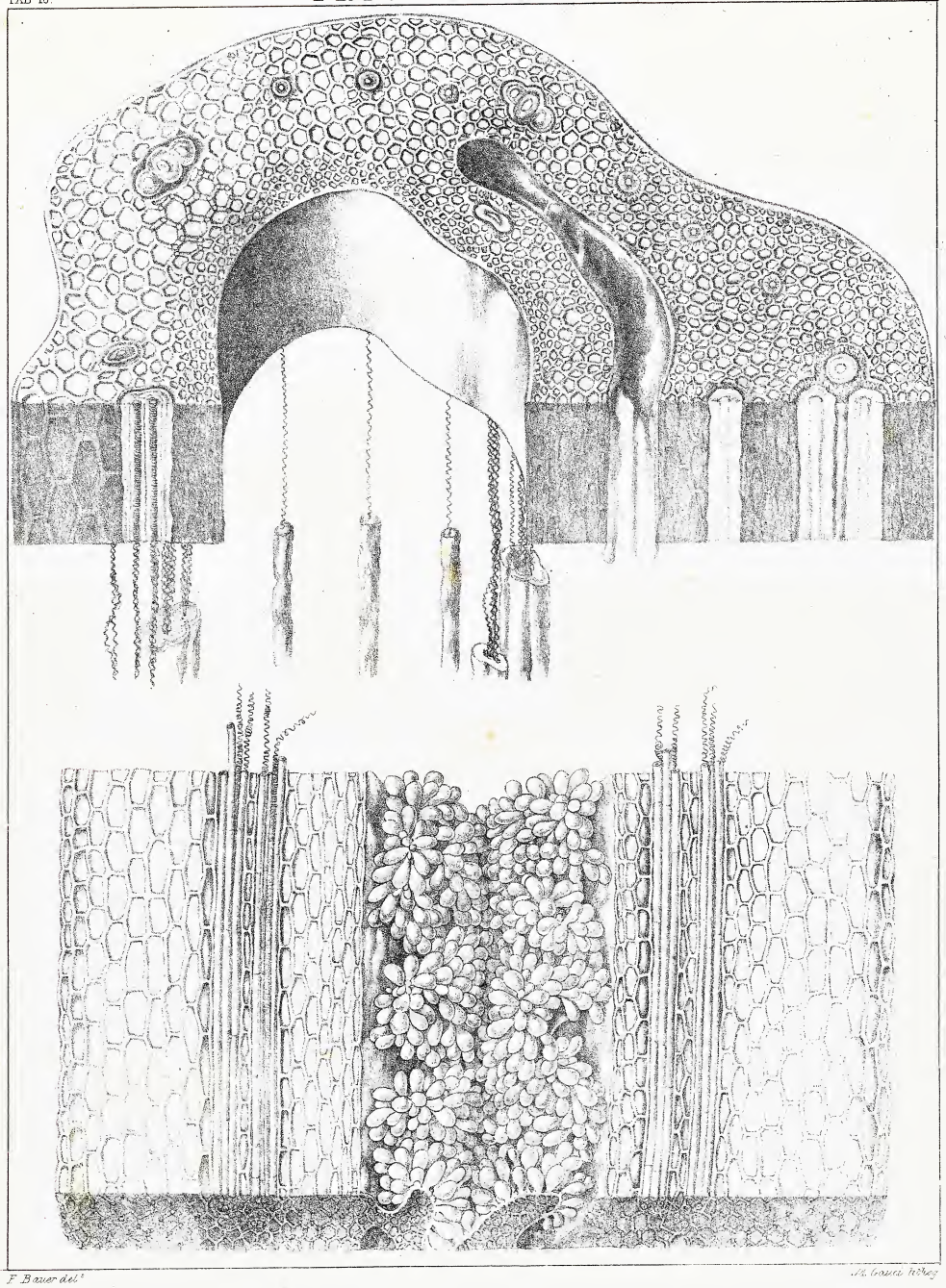
Tab. IX.

A transverse section of the ovarium of Bletia verecunda; from a sketch by Mr. Bauer in 1801.

This explains the plan upon which the ovarium of all Orchideæ is formed. It consists of six unequal pieces; of which three are smaller than the rest, and opposite the sepals; the three others opposite the petals; the latter only bear the placentæ, which are two-lobed, and covered with an infinite multitude of ovula. The axis of each piece of the ovarium is occupied by a bundle of vessels. Magnified 60 times.

TAB 10.

FRUCTIFICATION



F. Bauer del.ª

A. Lowe sculp.

FRUCTIFICATION.

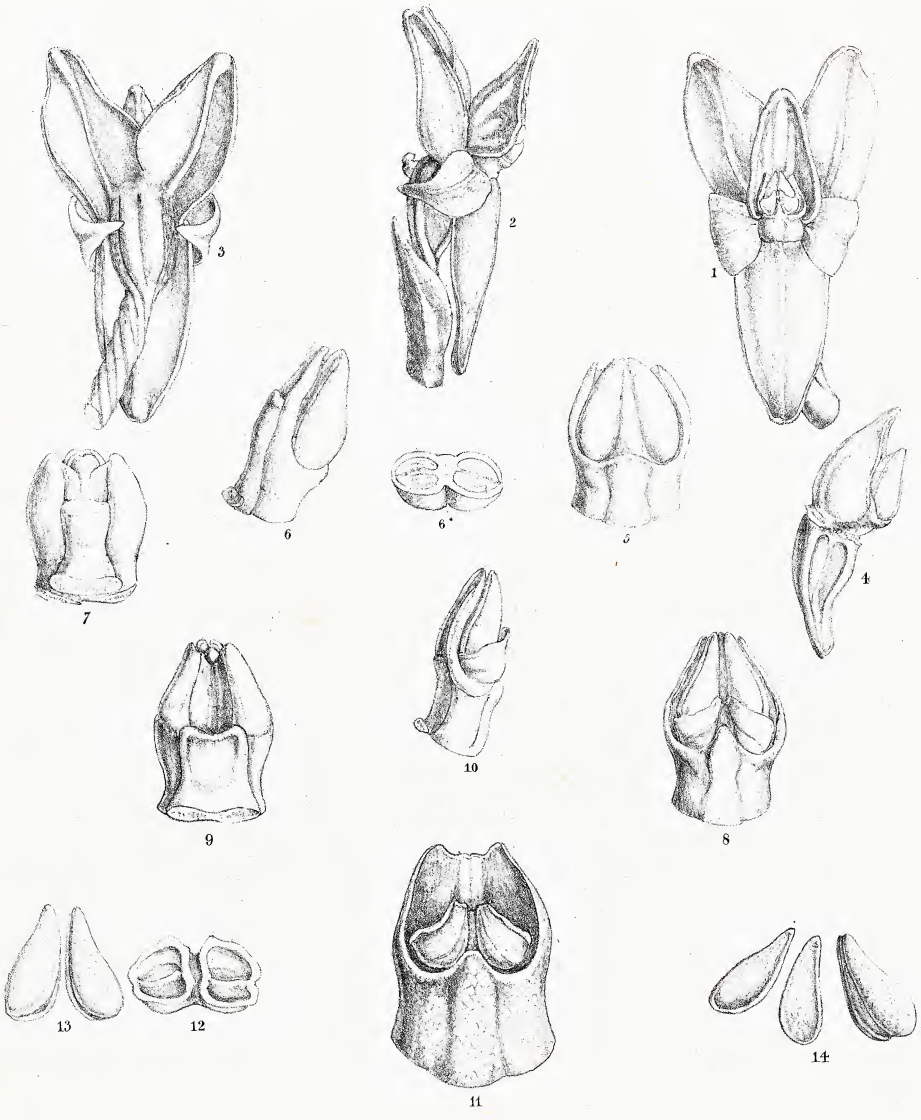
Tab. X.

Views of the anatomical structure of a column and ovarium; from sketches by Mr. Bauer in 1793.

The upper figure represents a transverse and vertical section of the column of Epidendrum ciliare. The larger cavity is that formed by the union of the labellum and column; the smaller represents the stigmatic canal, with its mucous lining. The mass of the column consists of hexagonal cellular tissue, among which are distributed various bundles of spiral vessels encased in very dense woody fibre; magnified 60 times.

The under figure is a vertical section of the portion of the ovarium of Bletia verecunda represented in Tab. IX. Magnified 60 times.

GENERA



Malaxis Paludosa.

... ad vivum Francisco Bauer

GENERA.

Tab. I.

The parts of Fructification of Malaxis paludosa (*Gen. and Sp. of Orchid. Pl. p.* 24); from a sketch made by Mr. Bauer in July 1801.

1. A front view of the expanded flower, shewing the relative position of the petals, sepals and column; magnified 15 times.
2. A side view of the same; the bractea seen at the foot of the ovarium; magnified 15 times.
3. A back view of the same, shewing the form of the ovarium and the twisted state of the peduncle; magnified 15 times.
4. A side view of the ovarium, column, and labellum of the unexpanded flower, the sepals and lateral petals having been removed; the anther is seen laterally, reposing upon the thin anterior lip of the column; the pollen masses not yet visible; magnified 15 times.
5. A back view of the column of an unexpanded flower, shewing the position of the anther with regard to the anterior lip of the column; magnified 30 times.
6. A side view of the same, shewing the relative proportion and position of the anther, the anterior lip of the column, and the prominence which occupies the face of the same part; magnified 30 times.

6* A transverse section of the anther of the same, shewing the existence at this period of a separation in each cell in the middle of the pollen, which finally causes it to appear in the form of four incumbent masses, as seen at fig. 13 and 14; magnified 30 times.

7. A front view of the column in the same state; this shews that the true form of the anterior lip of the column is two-lobed, with a marginal tumour between the lobes; this tumour is the true stigma. In front is the same prominence as is seen laterally at fig. 6; from which it appears that its superior extremity forms the anterior margin of the stigmatic cavity, and that at its lower extremity it is continuous with the labellum, the scar caused by the separation of which is distinctly shewn; magnified 30 times.

8. A back view of the column and anther after the expansion of the flower. This represents the advanced state of fig. 5; the parts have all acquired a greater firmness; the form of several is altered, and the case of the anther has contracted, leaving the pollen-masses exposed in their true position: that is, incumbent upon each other, not lying side by side; magnified 30 times.

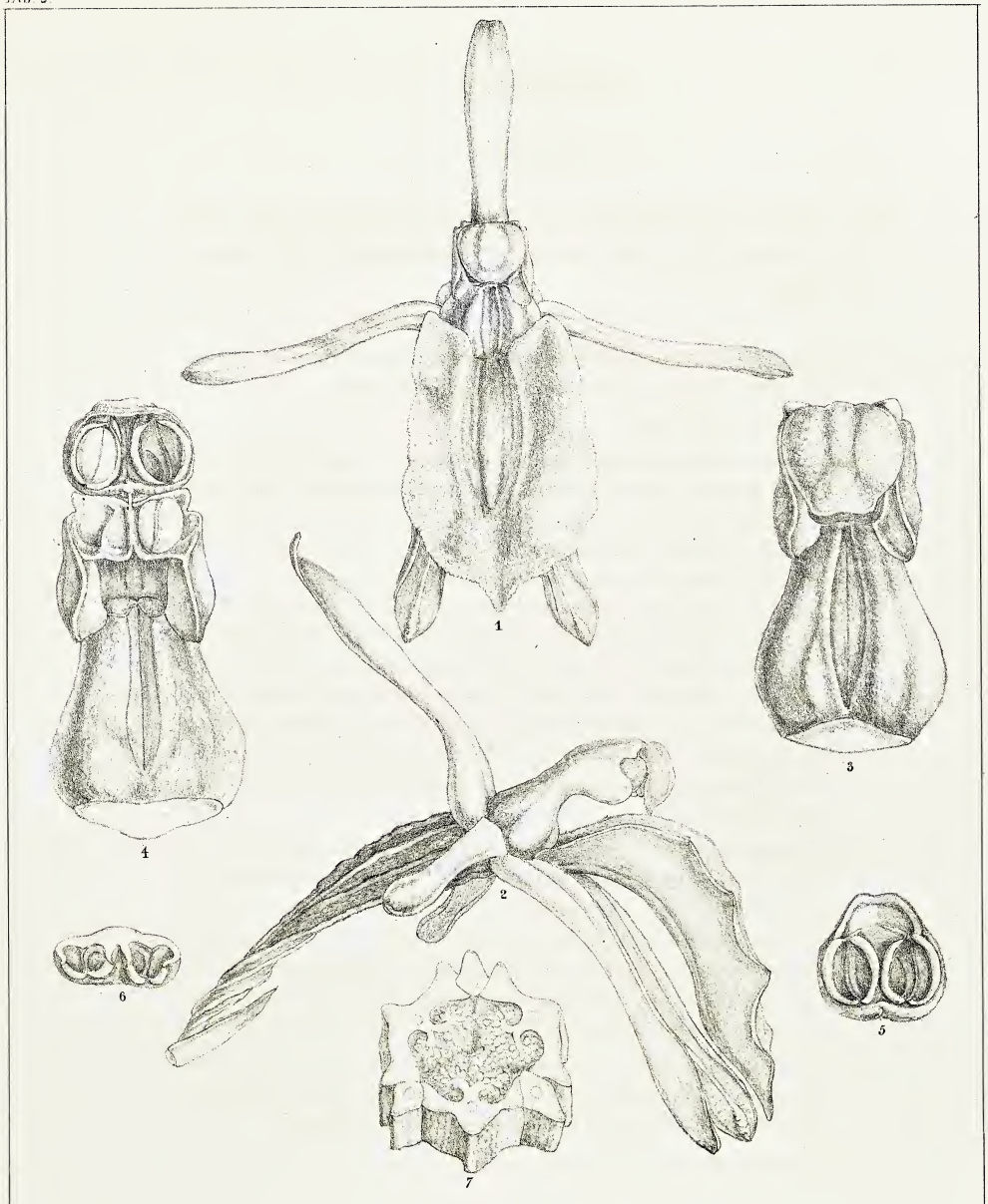
9. A view of the parts represented at fig. 7, in the state in which they appear when the flower is expanded; the stigmatic cavity is enlarged, and the true stigma is smaller and more acute; magnified 30 times.

10. A side view of the same; answering to fig. 6; magnified 30 times.

11. A back view of the column; the pollen-masses having fallen out; this explains the figure of the clinandrium or cavity in which the anther lies, and shews the form of the anterior lip of the column after fecundation; magnified 30 times.

12. A view of the face of the anther after the pollen-masses have fallen out; the lobes are seen to be incompletely two-celled, and to be distinctly separated by the connectivum; magnified 30 times.

13. 14. Different views of the pollen-masses at the time they separate from the anther; magnified 30 times. From this it is apparent that they are, at that time, destitute of all trace of caudicula, gland, or other process, and lie loose in the cells of the anther; thus constituting the principal distinctive character of Malaxideæ among Orchideous plants with waxy pollen.



Liparis Löselii.

J. L. ad iconem Francisci Bauer

GENERA.

Tab. II.

The parts of Fructification of Liparis Löselii (*Gen. and Sp. of Orch. Pl. p.* 28) ; from a sketch made by Mr. Bauer in 1801.

1. A front view of the expanded flower, shewing the relative position of the petals, sepals, and column ; magnified 10 times.
2. A side view of the same.
3. A front view of the column of an expanded flower ; magnified 20 times. In this figure is shewn the true position of the anther, with regard to the stigmatic cavity ; the clinandrium is seen to have two obtuse teeth at the back, and the column to have two fleshy ears or lobes towards its summit, and a longitudinal furrow in its face. At an earlier period there are two distinct tubercles at the foot of the column, and the longitudinal furrow is shallower. Before impregnation the anther is not incumbent upon the clinandrium, but so much erect that the cells are distinctly visible nearly their whole length, when the column is viewed from the front without disturbing the anther. At this period the true stigma is found to consist of two transparent, contiguous, but distinct, round glands, which afterwards disappear.
4. Represents the same column with the anther turned back, so as to lay naked the clinandrium and to expose the stigmatic cavity and pollen-masses. From this it appears that the two fleshy ears or lobes at the upper end of the column form the two sides of the quadrangular stigmatic surface, that the clinandrium is at right angles with the axis of the column, and that the position of the pollen-masses in the cavities of the anther is side by side, and not incumbent.
5. Is a view of the face of the anther without its pollen ; magnified 20 times. The position of its lobes will be found upon comparison with tab. 1. fig. 12. to be the reverse of that of Malaxis.
6. A transverse section of the last.

7. A section of the ovarium; magnified 20 times. This shews that the six valves into which the fruit finally separates exist distinctly in the ovarium, and have each their own vascular axis; the larger valves, from the face of which the two-lobed placenta proceeds, are opposite the petals, and the smaller ones without ovula are opposite the sepals.

GENERA.

Coelia Baueriana.

J. L. ad. ic. Francisci Bauer

GENERA.

Tab. III.

The parts of Fructification of Cœlia Bauerana (*Gen. and Sp. of Orchid. Pl. p.* 36); from a sketch by Mr. Bauer in February 1810.

1. A side view of the unexpanded flower; magnified 4 times.
2. A front view of an expanded flower; magnified 4 times.
3. A side view of the same, shewing the relative position of the column and labellum, the sepals and lateral petals having been removed.
4. A front view of the ovarium and column of an expanded flower; magnified 8 times. This represents the appearance of the ribs of the ovarium and their relative position.
5. The same seen from behind.
6. A front view of the column and anther; magnified 16 times. This shews the exact form and position of the clinandrium and anther before impregnation. The two elevated spaces below the anther are the stigma, which by reclining upon the anterior edge of the clinandrium almost closes up the stigmatic cavity.
7. A back view of the same.
8. A view of the clinandrium and anther after impregnation, with the pollen-masses falling out of the anthers; magnified 16 times. (In this figure the two sides of the column are represented of unequal size; this was inadvertently drawn upon the stone, but is not to be found in Mr. Bauer's sketch.)
9. A side view of the column before impregnation; the stigma is seen in front in the form of an ovate lobe, upon which the closed anther reclines.
10. A front view of the expanded anther; magnified 16 times.
11. A back view of the same.
12. 13. Two views of the pollen-masses fallen out of the anther, shewing their dilated extremities and the manner in which they curve outwards, so that each pair forms a sort of hollow case; magnified 16 times.

14. Grains of pollen separated by force; magnified 200 times. This shews that the pollen coheres in fours or threes.

15. 16. 17. Different views of the anther before expansion, shewing the narrow neck or connectivum by which the lobes are united, and the true figure of the latter; magnified 16 times.

18. A transverse section of the ovarium; magnified 16 times. From this it appears, that of the nine wings of that body three only belong to the placentiferous valves; of the remaining six two belong to each of the sterile valves.

19. A capsule bursting; shewing the manner in which all the segments of the perianthium cohere, so as to prevent the valves from opening entirely; magnified 4 times.

20. A transverse section of the same.

21. 22. 23. 24. Different views of seeds; magnified 25 times.

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